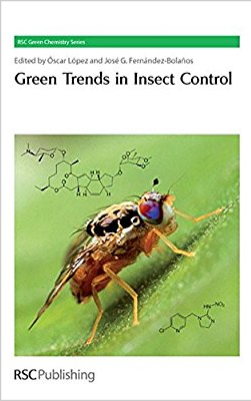

Green Trends in Insect Control: RSC (Green Chemistry Series)

From Royal Society of Chemistry

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This book presents the current approaches for insect pest control as a "green" alternative to classical and more toxaic agrochemicals. An overview of the recent advances in insecticide chemistry is also included, which will be of interest to a vast group of researchers - agrochemists, biochemists, chemists and toxicologists. The combination of both chemical and toxicological aspects of insecticides is unique and the book includes contributions from synthetic chemists, entomologists, environmentalists and toxicologists giving it wide appeal. Throughout the book, the different approaches that involve "greener chemicals" are emphasized. The book is divided into 9 chapters, each considering the state of art of each family of insecticides, together with future expectations. Each chapter gives a description of useful biorational insecticides, highlighting environmentally-friendly processes and then the mode of action is fully-described, emphasizing selectivity towards targeted species. Finally, for every family of compounds, their environmental effects (toxicity, bioaccumulation and metabolism) is considered, comparing them to classical insecticides, including human and environmental risk assessments. In addition the formulation, dispersal and persistence in the environment are covered as key aspects in developing greener agrochemicals. The book also includes a general introduction to entomology, with special emphasis on those insects that act as vectors in the spread of diseases. Insects that may be potential pests against humans and livestock are included, focusing on their life cycles, and physiology, as a logical comprehension of mode of action of insecticides. In addition there is a chapter on classical insecticides (covering both, approaches prior to the chemical era, and classical chemical insecticides, organochlorinated, organophosphorus, and carbamates) for comparison with current trends in pest control. The negative environmental effects that such insecticides have caused in nature, such as poisonings, bioaccumulation or toxic effects are highlighted. It is hoped that the use of more specific agrochemicals and approaches may avoid, or at least considerably reduce such severe and irreversible effects in nature. The insecticides covered are considered from numerous points of views: chemistry, toxicological profile, risk assessment, legal status, environmental behaviour and selectivity. The most important families of currently used insecticides are covered and critical discussions about future perspectives are included with frequent comparisons to classical insecticides. The following topics are covered in the book, as greener alternatives to classical insecticides: " Pyrethrins and

pyrethroids " Neonicotinoids " Spynosins " Insect growth regulators " Botanical insecticides " Microbial insecticides " Integrated Pest Management Programs (IPM)

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Editorial Review

Review

This book forming the ll 1

h part of the RSC Green Chemistry Series discusses the present approaches for insect pest control

as green alternatives to the classical and generally more toxic agrochemicals.

The first chapter contains the fundamentals of entomology, especially of the insects (mosquitoes, biting midges, flies, fleas

and lice) causing diseases (malaria, typhus, lymphatic filariasis, dengue, hemorrhagic fevers and certain encephalitis) by microbial

pathogens. The discussion of the mode of action of insecticides allows for the design of up-to-date and more efficient compounds.

The second chapter gives a historical account of the classical insecticides that are mostly non-green and should be replaced.

The three major groups, organochlorine, organophosphorus and carbamate insecticides are reviewed critically in the light of the

recommendations and restrictions of the European Union Committees and the World Health Organization.

The next two chapters are devoted to the discussion of the more developed insecticides, such as pyrethroids and neonicotinoids

that are much greener than the above shown classical agents due to their low mammalian toxicity. The advantages of

these up-to-date insecticides place them as promising pesticides of the future for domestic use or in the agriculture.

Up-to-date information is released on the mode of action of insecticides, and the toxicity and environmental impacts are also

discussed for all kinds of insecticides included in this book.

Chapters 5 and 6 describe the recent developments at Dow Agro-Chemicals. The first group embraces spinosyns, macrocyclic

lactones that were discovered ca. 25 years ago. The agents belonging to this group are green, on the one hand, in terms of the

production process (fermentation and semi-synthesis), and on the other hand, in terms of environmental behaviour. The other

group includes bisacylhydrazines belonging to the non-steroidal family of insect growth regulators that are again up-to-date

insecticides.

The use of botanical extracts as insecticides is discussed in the next chapter. Their market is rather limited (-1 %), but their

importance is significant.

Chapter 8 gives an overview on the production of insecticides from microbial sources (viruses, bacteria, fungi, etc.), and the

utilization of genetically-modified organisms is also discussed.

Finally, the principles of the Integrated Pest Management programmes are summarized, according to which the use of synthetic

pesticides must be reduced, while the pest populations should be maintained at an acceptable level. An important issue is

the intensification of crops meaning the appropriate selection of plant species utilizing bioengineered crops.

The recent advances in insecticide control are well summarized and are of interest for agrochemists, biochemists, chemists,

chemical engineers, biologists and toxicologists. The book may also be useful in academia to utilize its up-to-date knowledge in

the training of students.

(Gyorgy Keglevich *Current Green Chemistry*)

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(Dr Gyorgy Keglevich, Budapest University of Technology and Economics *Current Green Chemistry, 2014, Vol. 1, No. 3, 273*)

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About the Author
Dr Ëscar L¾pez received his PhD at Seville University in 2003 under the direction of Professor JosÚ G Fernßndez-Bola±os, JosÚ Fuentes and InÚs Maya. In March 2004, he was appointed as lecturer in Environmental Organic Chemistry at the University of Huelva, Spain. In June 2004, he was appointed as lecturer in Organic Chemistry at the University of Seville, Spain, in the Faculty of Chemistry. He spent 16 months (2005-2006) in a postdoctoral stay in Aarhus University, Denmark under the direction of Professor Mikael Bols working on the design of glycosidase inhibitors and the preparation of cyclodextrin derivatives as artificial enzymes. In 2009 he got a position as an Associate Professor in the Organic Chemistry Department, University of Seville, Spain. His research interests include Carbohydrate Chemistry, Heterocyclic Chemistry, Green Chemistry, Organoselenium Chemistry, Cyclodextrins and Supramolecular Chemistry, Glycosidase Inhibitors and Antioxidants. Professor JosÚ G Fernßndez-Bola±os completed his PhD at Seville University in 1984, after working on the synthesis of C-nucleoside of imidazol, under the direction of Professor JosÚ Fernßndez-Bola±os, his father, and Professor JosÚ Fuentes. He spent one year in a postdoctoral stay at the Technical University of Denmark, Lyngby, working on the synthesis and conformational analysis of sterically hindered oligosaccharides, under the direction of Professor Klaus Bock. He got a position as Professor at Seville University in 1987, and is currently a Professor of Organic Chemistry. His research interests include Carbohydrate Chemistry, Heterocyclic Chemistry, Green Chemistry, Organoselenium Chemistry, Cyclodextrins, Antioxidants from natural sources and Alkaloid Insecticides.

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